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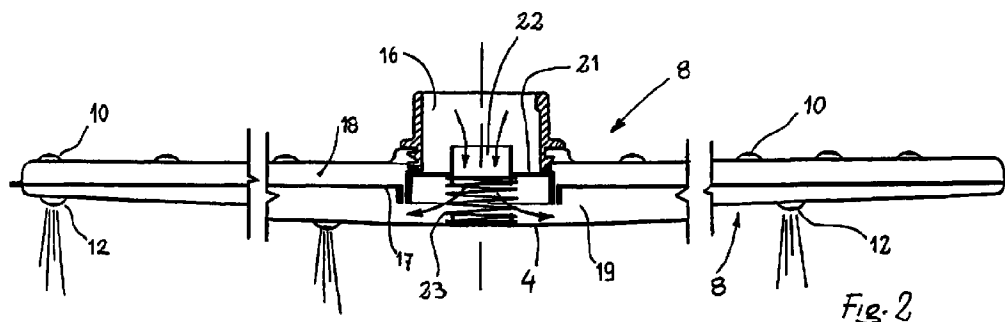
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(54) **Dishwashing machine with improved spray means**

(57) A rotating spray arm (8) with main spray nozzles and auxiliary spray nozzles comprises a hydraulic commutator arrangement (20-23) adapted to solely operate either the main spray nozzles (10) or the auxil-

iary spray nozzles (12) when the rotating spray arm is supplied with water at a higher or lower pressure, respectively.



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Description

[0001] The present invention relates to a dishwashing machine with improved spraying means, which are capable of enabling the machine to operate in a more versatile manner with substantial energy saving effects.

[0002] Modern dishwashing machines are generally known to usually comprise, to the purpose of supporting the various washload items in the interior of a washing vessel, an upper rack and a lower rack, below which there are arranged respective rotating spray arms with nozzles adapted to issue washing water spray jets directed upwards.

[0003] In order to ensure a more thorough washing action on the items on the lower rack, the upper rotating spray arm may also comprise nozzles adapted to issue auxiliary water spray jets that are directed downwards. These auxiliary water spray jets, however, cause the overall water flow rate of the washing water carrying circuit of the dishwashing machine, with particular reference to the therewith associated circulation pump, to be increased, which practically means a corresponding increase in the overall energy usage of the machine.

[0004] On the other hand, dishwashing machines are also known in the art which, as described for instance in DE-A-3 830 717, are substantially provided, in correspondence of the top wall of the washing vessel, with a further upper spray arm adapted to issue water spray jets that are directed downwards. By means of appropriate controlled commutator means it is possible for either the intermediate rotating spray arm only or the upper spray arm and the lower spray arm to be supplied with water selectively. In the latter case, the washload items arranged on the racks are hit, ie. wetted by water spray jets coming from above and water spray jets coming from below, at the same time. Such solutions, however, prove obviously unsatisfactory owing to the complicated construction involved by them. Moreover, the sizing of the washing water carrying circuit of the machine turns practically out as being clearly out-of-balance when considered with reference to the two different conditions in which either a single rotating spray arm is supplied or the two remaining rotating spray arms are supplied at the same time.

[0005] It is a main purpose of the present invention to provide a dishwashing machine of simple and reliable construction, provided with improved spraying means adapted to be operated in a selectively different manner in view of enabling a more versatile washing action to be brought about.

[0006] Furthermore, it is a purpose of the present invention to provide a dishwashing machine of the above cited kind, which is capable of operating automatically without any need for additional electromechanical component parts to be used to such an aim.

[0007] According to the present invention, these aims are reached in a dishwashing machine with improved spraying means embodying the features as

recited in the appended claims.

[0008] Anyway, characteristics and advantages of the present invention will become more readily apparent from the description that is given below by way of non-limiting example with reference to the accompanying drawings, in which:

- Figure 1 is a schematical view of a dishwashing machine according to the present invention; and
- Figures 2 and 3 are schematical, longitudinal-section views of an enlarged detail of the dishwashing machine illustrated in Figure 1, in respective operating conditions thereof.

[0009] With reference to the Figures, the dishwashing machine comprises mainly a washing vessel 5, in which there are accommodated, for supporting the washload items, at least an upper rack 6 and preferably at least a lower rack 7.

[0010] Said racks 6 and 7 are associated to respective spraying means that preferably comprise hollow rotating spray arms 8 and 9 arranged therebelow. These rotating spray arms are provided with a plurality of main spray nozzles 10 adapted to eject respective washing water spray jets that are substantially directed towards the respective racks, as this will be described in greater detail further on.

[0011] In a per sé known manner, at least one of these rotating spray arms 8, 9 also comprises at least an auxiliary nozzle 12 adapted to eject a respective water spray jet, as this will be better explained further on.

[0012] In the example being described here, a plurality of auxiliary nozzles 12 are provided in the upper rotating spray arm 8 to the purpose of ejecting water spray jets that are directed against the lower rack 7 arranged therebelow.

[0013] In all cases, the rotating spray arms 8, 9 are supplied with water which is delivered under pressure by a circulation pump 13, which is adapted to be operated so as to ensure that the pressure of the water supplying the rotating spray arms 8, 9 is selectively commutable between a higher value and a lower value. To such a purpose, the pump 13 may for instance be caused to operate in the manner as substantially described in IT-B-1 256 273.

[0014] According to a feature of the present invention, each rotating spray arm that is so provided with main nozzles 10 and auxiliary nozzles 12 (ie. the rotating spray arm 8 in the example described here) comprises commutator means adapted to enable the main nozzles 10 or the auxiliary nozzles 12 to be selectively supplied with water under pressure.

[0015] In other words, said commutator means are namely adapted to selectively connect the main nozzles 10 or the auxiliary nozzles 12 with the inlet port 16, which is connected to the pump 13, of the rotating spray arm 8 (Figure 2 and 3).

[0016] In a preferred manner, the commutator means are adapted to be operated hydraulically in an automatic manner and, to such a purpose, a partition wall 17 may be provided so as to substantially divide the interior of the rotating spray arm 8 into two separate chambers 18 and 19 communicating with the main nozzles 10 and the auxiliary nozzles 12, respectively.

[0017] The partition wall 17 is provided centrally with an aperture 20 in which a pan-like member 21 provided with a central passage 22 is able to slide freely, thereby substantially sealing it.

[0018] As illustrated in Figure 2, a substantially cylindrical compression spring 23 extending from the bottom wall 4 of the rotating spray arm 8 normally keeps the pan-like member 21 abutting against the rim of the inlet port 16, which therefore is prevented from communicating with the chamber 18. On the contrary, the inlet port 16 communicates with the chamber 19 through the passage 22, which has a smaller diameter.

[0019] The force of the spring 23 is so rated as to be able to keep the pan-like member 21 in the position shown in Figure 2 even when the pump 13 supplies the rotating spray arms 8, 9 with water having the afore cited lower pressure value. Therefore, the water that is delivered to the inlet port 16 of the rotating spray arm 8 operates the auxiliary nozzles 12 only by flowing into the chamber 19 through the passage 22 of the pan-like member 21, as well as passing through the expanded coils of the spring 23, as this is indicated by the arrows in Figure 2.

[0020] When the pump 13 on the contrary supplies the rotating spray arms 8, 9 with water having its afore cited higher pressure value, the water that is so delivered to the inlet port 16 of the rotating spray arm 8 exerts against the pan-like member 21 a hydraulic pushing force that causes the same pan-like member 21 to move off said inlet port 16 by overcoming the force of the spring 23. The latter is therefore substantially compressed against the wall 4, as this is shown in Figure 3, and the pan-like member 21 no longer interrupts the communication between the inlet port 16 and the chamber 18 of the rotating spray arm 8.

[0021] At the same time, the coils of the compressed spring 23 get closely packed against the wall 4 of the rotating spray arm 8 so as to substantially prevent the water from flowing from the passage 22 of the pan-like member to the chamber 19, thereby practically shutting off the same passage 22. As a result, the water that is delivered to the inlet port 16 of the rotating spray arm 8 is only able to operate the main nozzles 10 by flowing directly into the chamber 18 situated upstream of the pan-like member 21, as this is indicated by the arrows in Figure 3.

[0022] The operation of the dishwashing machine illustrated by way of example in Figure 1 can at this point be inferred easily. The pump 13 can be operated normally to supply the rotating spray arms 8, 9 with water having its afore cited higher pressure value. As a result,

only the main nozzles 10 will be operated in both rotating spray arms in this case, and the same main nozzles 10 will, in the example described herein, release respective water spray jets that are directed upwards in order to wet the washload items arranged in both racks 6, 7 from below.

[0023] In the particular case in which the pump 13 is selectively operated to supply the rotating spray arms 8, 9 with water having its afore cited lower pressure value, the main nozzles 10 will be still in action in the lower rotating spray arm 9 (in which no auxiliary nozzles are provided, actually), whereas only the auxiliary nozzles 12 will be able to be in action in the upper rotating spray arm 8.

[0024] In the described example, therefore, only the washload items supported by the lower rack 7 will be sprinkled from both below (by means of the rotating spray arm 9) and above (by means of the auxiliary spray nozzles 12 of the rotating spray arm 8).

[0025] It will be readily appreciated that, if the nozzles 10 and 12 of the rotating spray arm 8 are appropriately sized, the washing water carrying circuit of the dishwashing machine will prove substantially identical, and therefore advantageously balanced, in both afore described operating conditions of the machine.

[0026] It should furthermore be noticed that, if the afore described commutator means 20-23 are appropriately sized, the above described kind of operation may be obtained even if the difference between the afore cited higher and lower values of the water pressure is minimized, so that the overall hydraulic performance of the machine will be substantially balanced under any operating condition whatsoever.

[0027] The simplicity in the construction and the versatility in the operation of the dishwashing machine according to the present invention, which uses just a few simple and reliable additional component parts in its water carrying and handling circuit, can now be readily and fully appreciated.

[0028] It will be also appreciated that the afore described dishwashing machine may be the subject of a number of modifications without departing from the scope of the present invention.

[0029] For instance, the arrangement of main nozzles and/or auxiliary nozzles in the rotating spray arms 8, 9 may be combined in any different manner, according to the actual requirements, just as the orientation of the nozzles themselves may be different as well.

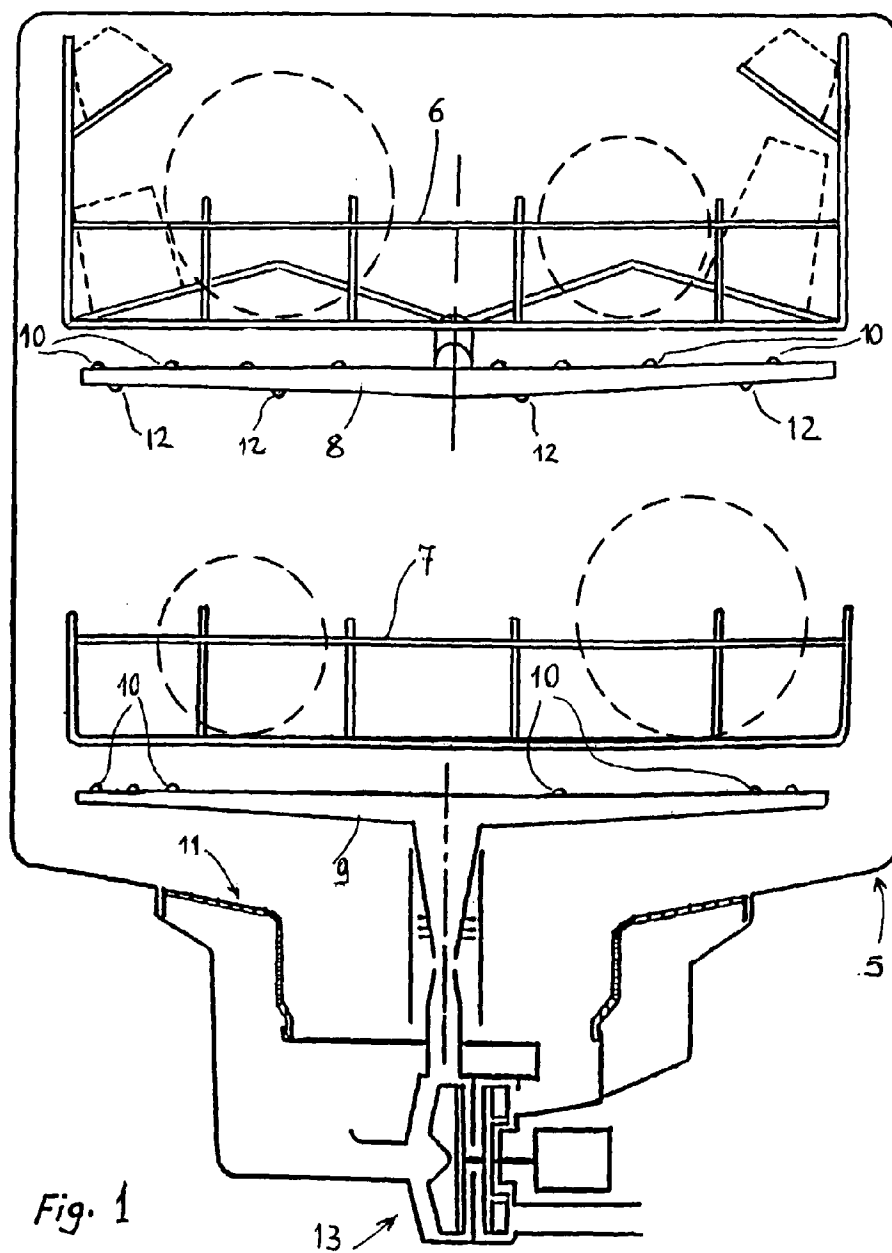
[0030] Furthermore, the commutator means 20-23 may comprise per se known (and not shown) sealing means in view of ensuring an improved water sealing effect in the various flow-diverting or shut-off positions thereof.

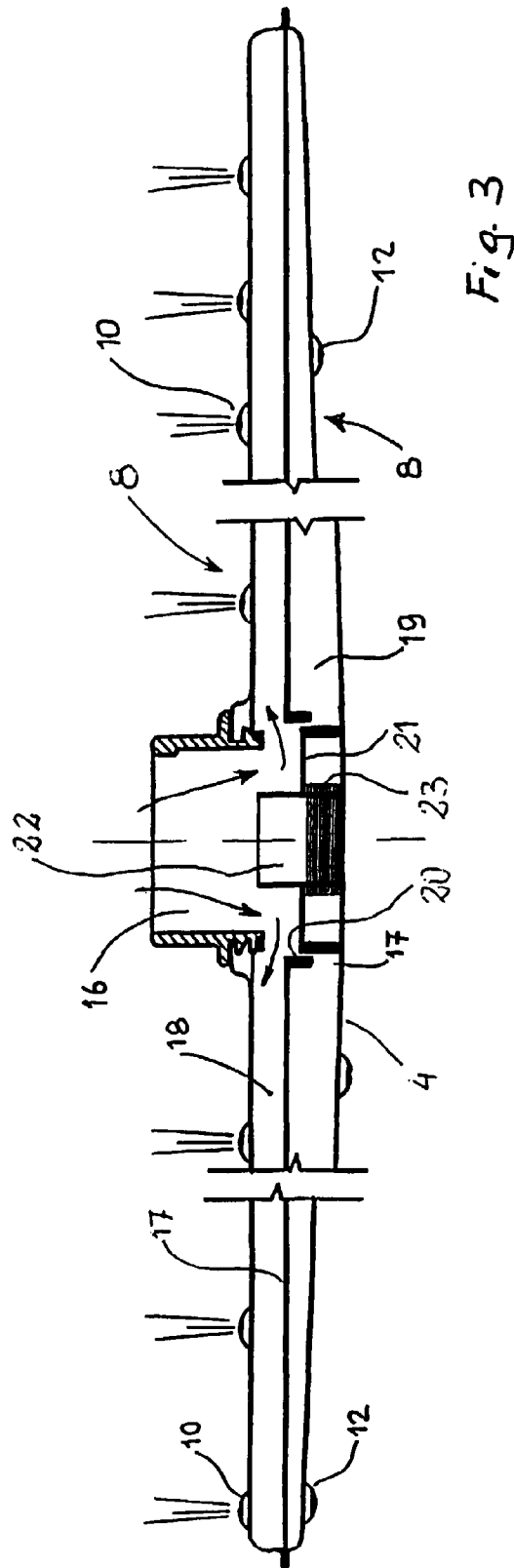
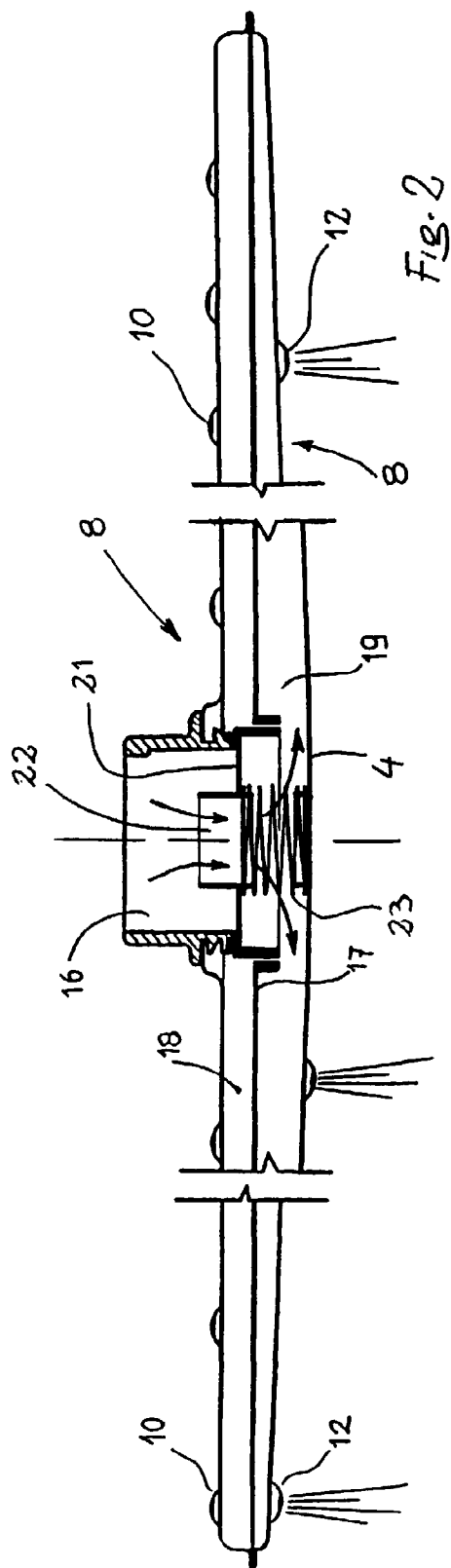
[0031] It should finally be noticed that the present invention may be advantageously applied also to a dishwashing machine in which the rotating spray arms 8, 9 are supplied alternately, as described for instance in EP-B-0 237 994.

Claims

pressed coils of said spring (23).

1. Dishwashing machine, comprising a washing vessel in which there are accommodated at least a rack supporting the washload items, as well as spraying means having at least a main nozzle and at least an auxiliary nozzle adapted to release respective water spray jets, **characterized in that** the spraying means (8) comprise commutator means (20-23) adapted to enable said main nozzle (10) or said auxiliary nozzle (12) to be supplied selectively with water under pressure. 5 10
2. Dishwashing machine according to claim 1, in which said spraying means comprise at least an inlet port capable of being supplied with said water under pressure, **characterized in that** said commutator means (20-23) are adapted to selectively connect said main nozzle (10), or said auxiliary nozzle (12), with said inlet port (16) of the spraying means (8). 15 20
3. Dishwashing machine according to claim 2, **characterized in that** said commutator means (20-23) are adapted to be actuated hydraulically by the water supplying the spraying means (8). 25
4. Dishwashing machine according to claim 3, **characterized in that** the interior of the spraying means (8) is subdivided into a first chamber (18), which communicates with said main nozzle (10), and a second chamber (19), which communicates with said auxiliary nozzle (12), said commutator means comprising a moving pan-like member (21) that is loaded by a spring (23) and is adapted to enable said inlet port (16), when the latter is supplied with water having a lower pressure value, to communicate with the second chamber (19) only, said pan-like member (21) being adapted to move, by overcoming the force of the spring (23), so as to enable said inlet port (16), when the latter is supplied with water having a higher pressure value, to communicate with said first chamber (18) only. 30 35 40
5. Dishwashing machine according to claim 4, **characterized in that**, when the inlet port (16) is supplied with water having said lower pressure value, said port (16) communicates with said second chamber (19) via a passage (22) provided in said pan-like member (21) and through the expanded coils of said spring (23). 45 50
6. Dishwashing machine according to claim 5, **characterized in that**, when the inlet port (16) is supplied with water having said higher pressure value, said port (16) communicates with said first chamber (18) upstream of said pan-like-member (21), whose passage (22) is substantially plugged by the com- 55







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EUROPEAN SEARCH REPORT

Application Number
EP 00 10 2536

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 3 August 2000	Examiner Norman, P
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 00 10 2536

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